Practice Sheet 1 - Python Programming

Asst. Prof. Syed Faisal Ali Programming Fundamentals - FALL 2019 Software Engineering
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Q1: Show how we can import 10 differnt functions from math library of python, such as trignometric or hyperbolic functions and two constants pi and e, and store 6 different angles such as zero, thirty, forty five, sixty, ninty and one hundred and eighty. Show them how you will use in program by giving them some values and print them.

In [28]:

```
import math
angle1=0
angle2=30
angle3=45
angle4=60
angle5=90
angle6=180

#TRIGNOMETRIC FUNCTIONS
print('Sin(0) is: ',math.sin(0))
print('Sin(30) is: ',math.sin(30))
print('Sin(45) is: ',math.sin(45))
print('Sin(60) is: ',math.sin(60))
print('Sin(90) is: ',math.sin(90))
print('Sin(180) is: ',math.sin(180))
print()
print('cos(0) is: ',math.cos(0))
print('cos(30) is: ',math.cos(30))
print('cos(45) is: ',math.cos(45))
print('cos(60) is: ',math.cos(60))
print('cos(90) is: ',math.cos(90))
print('cos(180) is: ',math.cos(180))
print()
print('tan(0) is: ',math.tan(0))
print('tan(30) is: ',math.tan(30))
print('tan(45) is: ',math.tan(45))
print('tan(60) is: ',math.tan(60))
print('tan(90) is: ',math.tan(90))
print('tan(180) is: ',math.tan(180))
print()
#PARABOLIC FUNCTIONS FOR SIN
print("asinh (0)  is : ", math.asinh(0))
print("asinh (30) is : ", math.asinh(30))
print("asinh (45) is : ", math.asinh(45))
print("asinh (60) is : ", math.asinh(60))
print("asinh (90) is : ", math.asinh(90))
print("asinh (180) is : ", math.asinh(180))

#PARABOLIC FUNCTIONS FOR COS

print("acosh (30)  is : ", math.acosh(30))
print("acosh (45) is : ", math.acosh(45))
print("acosh (60) is : ", math.acosh(60))
print("acosh (90) is : ", math.acosh(90))
print("acosh (180) is : ", math.acosh(180))
print()
#PARABOLIC FUNCTIONS FOR TAN

print("atanh (0)  is : ", math.atanh(0))

#VALUE OF PI
print("Value of pi:",math.pi)

#VALUE OF e
print("Value of e:",math.e)
```

```
Sin(0) is:  0.0
Sin(30) is:  -0.9880316240928618
Sin(45) is:  0.8509035245341184
Sin(60) is:  -0.3048106211022167
Sin(90) is:  0.8939966636005579
Sin(180) is:  -0.8011526357338304

cos(0) is:  1.0
cos(30) is:  0.15425144988758405
cos(45) is:  0.5253219888177297
cos(60) is:  -0.9524129804151563
cos(90) is:  -0.4480736161291701
cos(180) is:  -0.5984600690578581

tan(0) is:  0.0
tan(30) is:  -6.405331196646276
tan(45) is:  1.6197751905438615
tan(60) is:  0.320040389379563
tan(90) is:  -1.995200412208242
tan(180) is:  1.3386902103511544

asinh (0)  is :  0.0
asinh (30) is :  4.09462222433053
asinh (45) is :  4.49993310426429
asinh (60) is :  4.78756117999381
asinh (90) is :  5.192987713658941
asinh (180) is :  5.886111747410234
acosh (30)  is :  4.0940666686320855
acosh (45) is :  4.499686190671499
acosh (60) is :  4.787422291102689
acosh (90) is :  5.192925985263684
acosh (180) is :  5.886096315311465

atanh (0)  is :  0.0
Value of pi: 3.141592653589793
Value of e: 2.718281828459045
```

In [2]:

```
import math

#LOG FUNCTION
print("log(6):",math.log(6))
#POWER
print ("math.pow:" , math.pow(2, 3))
print()
print("Time taken:10mins")
```

```
log(6): 1.791759469228055
math.pow: 8.0

Time taken:10mins
```

Q2. Use help() command to show what is math library, int, and class.

In [14]:

```
help(int)
help(list)
help('math.pow')
help('math.pi')
help('math.sqrt')
print()
print("Time taken:7mins")
```

```
Help on class int in module builtins:

class int(object)
 |  int([x]) -> integer
 |  int(x, base=10) -> integer
 |
 |  Convert a number or string to an integer, or return 0 if no arguments
 |  are given.  If x is a number, return x.__int__().  For floating point
 |  numbers, this truncates towards zero.
 |
 |  If x is not a number or if base is given, then x must be a string,
 |  bytes, or bytearray instance representing an integer literal in the
 |  given base.  The literal can be preceded by '+' or '-' and be surround
ed
 |  by whitespace.  The base defaults to 10.  Valid bases are 0 and 2-36.
 |  Base 0 means to interpret the base from the string as an integer liter
al.
 |  >>> int('0b100', base=0)
 |  4
 '
```

Q3. Use len() function to show the lenght of your name stored in a variable my_name.

In [1]:

```
my_name = "Abdullah Wasim"
print ("Length of my name is: ",len(my_name))

print("Time taken: 40 sec")
```

```
Length of my name is:  14
Time taken: 40 sec
```

Q4: We use type() function to show the type of the variable. Your task is to use it on different type of variables in which you save your name, date of birth, cell number, email, favourite dish, favourite color, favourite movie, favourite flower, etc.

In [2]:

```
name="Abdullah Wasim"
dateOfBirth= "21 Dec 2001"
number=3350506080
email='abdullah@gmail.com'
favDish="Dhoka"
favColor="Black"
favMovie="17 Again"
favFlower="flowerpasandnai"

print(type(name))
print(type(dateOfBirth))
print(type(number))
print(type(email))
print(type(favDish))
print(type(favColor))
print(type(favMovie))
print(type(favFlower))
```

```
<class 'str'>
<class 'str'>
<class 'int'>
<class 'str'>
<class 'str'>
<class 'str'>
<class 'str'>
<class 'str'>
```

Q5: A football is kicked 1 meter from the ground at an angle of 30 degree with a velocity of 15 m/sec. Calculate the following:
a. Max height above the ground.
b. Total time in the air.
c. Total distance traveled.
d. Velocity vector at max height.
e. Velocity when the ball hits the ground.

In [8]:

```
#For max height
import math
angle_in_degrees = 30
V = 15
g = 9.8
a = math.sin(30)
x = V**2*a**2
y = 2*g
H = x/y
print ("The maximum height above the ground is : " + str(H) + " meters ")
print()

#Total time in air
V = 15
g = 9.8
a = math.sin(math.degrees(30))
b = 2*V
c = b*a
T = -c/g
print ("The Total Time in the air : " + str(T) + " Sec ")
print()

#Total distance
V = 15
t = 3.024
g = 9.8
S = -(V*t*math.sin(30) - 1/2*g*t**2)
print ("The Total Distance Travelled in : " + str (S) + " meters ")
print()

#Vector velocity at max height
V = 15
g = -9.8
t = 3.024
V = V*math.sin(30)-g*t
print ("The Velocity Vector at Max Height is : " + str (V) + " m/s ")
print()

#Velocity when ball hits the ground
from math import sqrt
V = 15
g = 9.8
h = 11.2
t = sqrt(2*h/g)
Vf = V+g*t
print ("The Velocity when ball hits the ground is : " + str (Vf) + " m/s ")
print()
print ("Time Taken 20min")
```

```
The maximum height above the ground is : 11.20645205595434 meters

The Total Time in the air : 1.25440346502288 Sec

The Total Distance Travelled in : 89.62553686885221 meters

The Velocity Vector at Max Height is : 14.814725638607074 m/s
```

```
The Velocity when ball hits the ground is : 29.816207341961707 m/s

Time Taken 20min
```

Q6: A mass of 5 kg is placed in an inclined plane. If 10 N force applied on it and the friction on the inclined plane is 0.4. Find, Sin, Cos and its movement for angle 30, 45 and 60 degrees ?

 mass

In [4]:

```
import math
m = 5
F = 10
g = 9.8
Ff = 0.4
angle1 = 30
angle2 = 45
angle3 = 60

#For sin and cos

Totangle = angle3+angle2+angle1

print("Total Angle: ",(Totangle),'Degree')
print()

#Movement

movement= math.sin(Totangle)*m*g
print("Movement  :",(movement),'N')
print()

#For cos

angle2 = angle1-angle2-angle3
print("Angle2 is ",(angle2),'Degree')
print()
R = math.cos(angle2)* m * g * Ff
print("The Resultant force and movemnent is :" ,(R),'m/s')
```

```
Total Angle:  135 Degree

Movement  : 4.330065619096071 N

Angle2 is  -75 Degree

The Resultant force and movemnent is : 18.066324886605088 m/s
```

Q7: Three resiters of 10, 20 and 30 ohms are connected in series and in parallel if 10 V is given to them find current and voltages across them.

In [3]:

```
#Resistors in Series

R1=10
R2=20
R3=30
V=10
Rt=R1+R2+R3
I=V/Rt
V1=I*R1
V2=I*R2
V3=I*R3
print("Total Current across series circuit: ",I,"A")
print("Voltage across R1:",V1,"V")
print("Voltage across R2:",V2,"V")
print("Voltage across R3:",V3,"V")
print()

#Resistors in Parallel
TotResistance=1/(1/R1 +1/R2 +1/R3)
TotCurrent=V/TotResistance
I1=V/R1
I2=V/R2
I3=V/R3

print("Total current accross parallel circuit: ",TotCurrent,"A")
print("Current across R1:",I1,"A")
print("Current across R2:",I2,"A")
print("Current across R3:",I3,"A")


print("Time taken to solve: Approx 10 mins")
```

```
Total Current across series circuit:  0.16666666666666666 A
Voltage across R1: 1.6666666666666665 V
Voltage across R2: 3.333333333333333 V
Voltage across R3: 5.0 V

Total current accross parallel circuit:  1.8333333333333335 A
Current across R1: 1.0 A
Current across R2: 0.5 A
Current across R3: 0.3333333333333333 A
Time taken to solve: Approx 10 mins
```

Q8. Find the point of intercept if line 1 coordinates are (1,5), (7, 9) and line 2 coordinates are (2,4) (6,9).

In [7]:

```
import math

#For line 1
x1 = 1
x2 = 7
y1 = 7
y2 = 9

a1 = (y2-y1)/(x2-x1)
print ("Gradient of line 1 : " , a1)

C2 = y1-a1*x1
print ("y intercept of line 1 is: " , C2)
print ("Equation of Line 1 is: 0.6x - y + 4.3 = 0 ")

# For line 2

x3 = 6
x4 = 2
Y3 = 9
y4 = 4

a2 = (y4-Y3)/(x4-x3)
print ("Gradient of line 2 is: " , a2)

C3 = Y3-a2*x3
print ("y intercept of line 1 is: " , C3)
print ("Equation of Line 2 is: 1.25x - y + 1.5 = 0 ")

xCord = (C3-C2)/(a2-a1)
yCord = (C2*a2-C3*a1)/(a2-a1)

print ("The X coordinate of the point is: " , xCord)
print ("The Y coordinate of the point is : " , yCord)
```

```
Gradient of line 1 :  0.3333333333333333
y intercept of line 1 is:  6.666666666666667
Equation of Line 1 is: 0.6x - y + 4.3 = 0
Gradient of line 2 is:  1.25
y intercept of line 1 is:  1.5
Equation of Line 2 is: 1.25x - y + 1.5 = 0
The X coordinate of the point is:  -5.636363636363636
The Y coordinate of the point is :  8.545454545454545
```

Q9: Write a small program which have unit price of 10 items such as eggs Rs 120 dozen, milk Rs 95 liter, butter 100 Rs for 125 gms, etc Now ask from the user one by one what he wants and how many he wants. Then do the total amount of purchase.

In [13]:

```
Egg=120
milk=95
apple=50
butter=100
yoghurt=80
bread=55
bun=10
cake=40
biscuit=20
sandwich=25

a=eval(input("Eggs is 120rs/dozen,Enter how much you want: "))
b=eval(input("Milk is 95rs/liter,Enter how much you want: "))
c=eval(input("Apples are 50rs/6,Enter how much you want: "))
d=eval(input("Butter is 100rs/125gm,Enter how much you want: "))
e=eval(input("Yoghurt is 80rs/kilo,Enter how much you want: "))
f=eval(input("Bread is 55rs/loaf,Enter how much you want: "))
g=eval(input("Bun is 10rs/piece,Enter how much you want: "))
h=eval(input("Cake is 40rs,Enter how much you want: "))
i=eval(input("Biscuit is 20rs/box,Enter how much you want: "))
j=eval(input("Sandwich is 25rs/piece,Enter how much you want: "))

totalamount=((a*Egg)+(b*milk)+(c*apple)+(d*butter)+(e*yoghurt)+(f*bread)+(g*bun)+(h*cake)+(


print("Total amount to be paid: ",totalamount,"rs")
```

```
Eggs is 120rs/dozen,Enter how much you want: 1
Milk is 95rs/liter,Enter how much you want: 2
Apples are 50rs/6,Enter how much you want: 0
Butter is 100rs/125gm,Enter how much you want: 0
Yoghurt is 80rs/kilo,Enter how much you want: 0
Bread is 55rs/loaf,Enter how much you want: 1
Bun is 10rs/piece,Enter how much you want: 2
Cake is 40rs,Enter how much you want: 1
Biscuit is 20rs/box,Enter how much you want: 2
Sandwich is 25rs/piece,Enter how much you want: 2
Total amount to be paid:  515 rs
```

Q10: A 5m 60cm high vertical pole casts a shadow 3m 20 cm long. Find at the same time
(i) the length of the shadow cast another pole 10m 50cm high
(ii) the height of a pole which casts a shadow 5m long.

In [19]:

```
#Lenght of shadow casted by 10m50cm high pole
H1=5.60
L1=3.20
H2=10.50
Temp = H2*L1
x = Temp/H1
print("The lenght of shadow casted by 10m50cm high pole is: ",x,"m")
print()

#Height of pole which cast by 5m long shadow
L2=5
y=H1/L1
H3=y*L2
print("The height of the pole which cast shadow of 5m is: ",H3,"m")
```

```
The lenght of shadow casted by 10m50cm high pole is:  6.000000000000001 m

The height of the pole which cast shadow of 5m is:  8.749999999999998 m
```

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